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L. B. CASE'S BOTANICAL INDEX

AN

Illustrated Quarterly Botanical Magazine.

RICHMOND, INDIANA.

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L. B. CASE'S

BOTANICAL INDEX

AN ILLUSTRATED QUARTERLY BOTANICAL MAGAZINE.

VOL. 2.—No. 3. RICHMOND, IND., JULY, 1879. {Published Quarterly, at 25 Cents a Year.

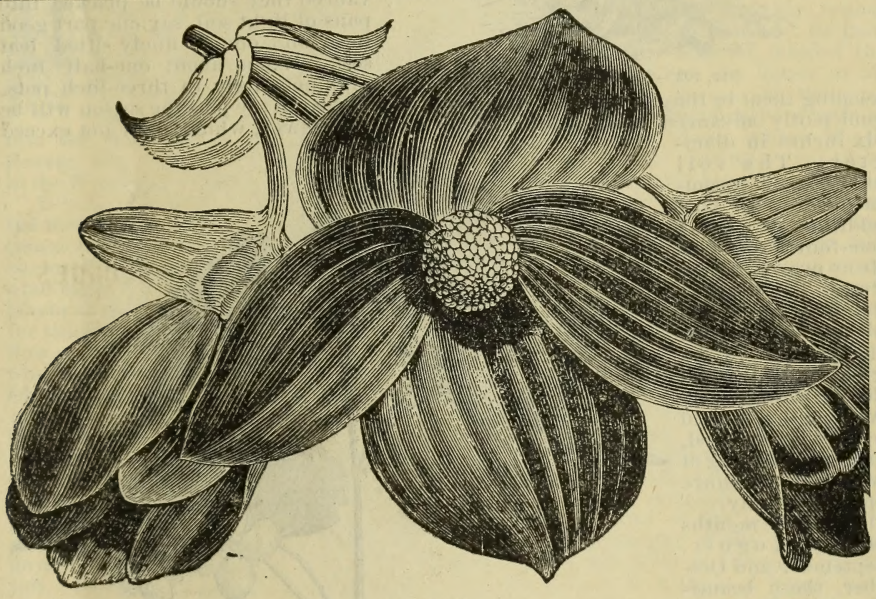


FIG. 102.

TUBEROUS ROOTED BEGONIAS.

BY DANIEL BARKER, BRAMBELTON, NORFOLK, VA.

A FEW years ago it occurred to me that the "Tuberous Rooted Begonias" possessed many qualities which, if properly developed, would bring them to the very front as greenhouse, window, and bedding plants. They had not then had that attention bestowed upon them that their merits deserved. I resolved to try it in various ways. I procured in Europe and this country packages of seed, which were (save one) very disappointing. From one packet I had a few which were decided improvements, and which have been the parents of some very fine varieties, adapted alike for the conservatory, dwelling house, rustic baskets, and for bedding out in the flower garden. One of the principal steps made was in variety of color. The best of each kind was carefully selected, taking into account color, habit, and constitution. For some time the same process has been going on, the result of which is very satisfactory. The seeds this season (saved from the finest varieties) have germinated more freely than ever, and the

plants are now numbered by the thousands. We have a few varieties possessing all the requisites of first rate decorative plants, either for the greenhouse, garden, table decoration, or grouping with ferns, etc., in large baskets, etc.

FIG. 103.—*Begonia Hybrida.*

CULTURE BY SEED.

In order to have plants in flower by June, the seed should be sown in March, in a well drained seed pan, filled with light sandy soil (*entirely free from any mixture of manure, however well decomposed*). The seed should be slightly pressed into earth and the pan placed in a moderately warm place, placing a piece of glass over the pan, and covering the glass with thick paper until the seed have germinated, when all covering must be removed, and the young plants shaded during bright sunshine. When sufficiently advanced they should be pricked into pans of light soil, say one part good loam and one of finely sifted leaf soil. When about one-half inch high pot singly in three-inch pots, keeping them in the greenhouse. When well established in the pots the season will be sufficiently advanced to shift into pots in which to flower, which need not exceed six inches in diameter. The soil as before recommended, with the addition of about one-fourth of well decomposed cow dung. For the garden we plant out about May, when the ground is in good working order. During warm weather they should be well watered, and a top dressing of well rotted manure applied in July.

During the months of July, August, September and October, these beautiful free-blooming plants are amongst the most beautiful of all our summer-blooming plants, and as ornaments for the greenhouse, garden, dwelling, rustic or hanging baskets, they are unsurpassed.

FIG. 104.—*Begonia Weltoniensis.*

[If there is any one class of plants more than another that we particularly admire, it is the Begonia, and about half suspect the large majority of plant-lovers share our admiration for them, or would, if they could only succeed in growing them to perfection with anything like ordinary culture. But here is just where the trouble and disappointment often arises, for every one that has attempted to grow Begonias, know how difficult it is to prevent the soft and succulent, or almost watery, leaves and stems from decaying, (damping off,) whenever we have a few days of damp weather. This is especially the case in the central portion of the whole North Ameri-

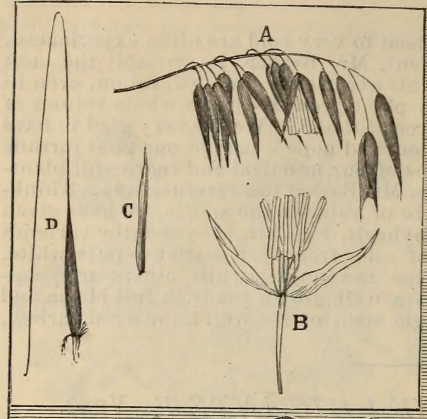
can continent, where changes from extreme heat to very cold are often experienced, even in a very few hours. Our correspondent, Mr. Barker, is probably the most successful Begonia grower in America, and his experience and observation, even in a short article, will have more weight with plant-growers than a whole volume of theories, or even instructions, from a less successful one. We are very glad to have the privilege of publishing this communication, and hope it may be our good fortune to have more of the same sort from the pens of our practical and successful plant-growers. We commend the above article from Mr. Barker to a careful study. Thinking, perhaps, a few good illustrations would be of value to the article, we have given first, a figure of a flower of one of the new hybrids, Fig. 102, of which the varieties are *legion*, and are of all colors and shades of color from deep scarlet to pure white. The flowers, of some varieties, are very large and single, while others are semi-double, or even double. Fig. 103 represents a well grown plant in full bloom and splendid foliage. Fig. 104 represents a single stem of the well known old variety, B. Weltoniensis.—Ed. Index.]

FLOWERING OF FURCRŒA GIGANTEA. Vent.

UNDER the above name, is often seen in cultivation, a plant strongly resembling the ordinary Agave or Century plant in general appearance; in fact, it was considered an Agave until a French botanist, Ventenet, divided the genus Agave, and arranged under the name of *Furcræa* (in honor of M. Fourcroya) a few species with *Agave fœtida* (*Furcræa gigantea*) as the type. This species is a native of South America, and rather extensively introduced into the West Indies and adjoining Islands as a decorative plant, where M. E. Reeves, Esq., of Richmond, Indiana, procured two small plants, during a visit there in the Winter of 1869, and brought home to help beautify his already beautiful grounds.

It is so seldom they bloom in this latitude, that a daily record of the growth of the flower stem may be of interest. The plants were standing on the lawn, and had commenced to throw up the flower stalk when first noticed, (Aug. 2d) but was still enclosed by three large leaves which soon unfolded. The first plant to flower measured eight feet and nine inches, as it stood in the tub, from tip to tip of the longest leaves at the base; or each leaf about four feet and two inches long, with five inches for thickness of the body of plant. The second plant commenced to throw up the flower stem August 12, but was soon removed to the National Soldiers' Home, Dayton, Ohio, and placed in the Martindale Conservatory, where the flower stem reached thirty-four feet in height, and ripened its seed. Both plants were, probably, the same age, and about the same size; the Dayton specimen, perhaps, growing a little the strongest. The leaves of the first one to bloom were broad and ridged, like all Agaves, at the 20th of August, but as the stem increased in height the leaves gradually withered, until by the time the flower stalk was fifteen feet high, the leaves had lost their usual tropical growth and vigor; still, however, remaining green. The plant was measured every morning about 9 A. M., the foot of the pole used for measuring resting upon a leaf close by, and at the same height of the base of the flower stem, which was ten and one-half inches above the level of the earth in the tub. Being so very tall it would be impossible to protect it without a house built especially for its accommodation, which was not thought desirable, and the early frosts chilling the flowers they did not come to perfection. After the chilling of the plant (Sept. 14th) it grew so little each day that it was scarcely perceptible; but it continued to increase in height until it reached 29 feet 2 inches.

Aug.	2.	1 ft.,	7½ in.	
"	3.	2 "	7 "	Air cool with rain.
"	4.	3 "	2½ "	Air cold.
"	5.	3 "	11½ "	
"	6.	4 "	10 "	Thermometer 56° last night.
"	7.	5 "	8 "	Warm night.
"	8.	6 "	5½ "	
"	9.	7 "	4 "	Cold and rainy,
"	10.	8 "	3 "	Cold and rainy.
"	11.	9 "		
"	12.	9 "	6 "	
"	13.	10 "	2 "	
"	14.	10 "	8 "	Cool and clear.
"	15.	11 "	4½ "	Cool and clear.
"	16.	12 "	2 "	
"	17.	13 "	10½ "	
"	18.	14 "	9 "	Hard cold rain.
"	19.	15 "	6½ "	
"	20.	16 "	1½ "	
"	21.	17 "		
"	22.	17 "	4 "	Nights cold.
"	23.	18 "		
Aug.	24.	18 ft.,	5 in.	Clear and cold nights.
"	25.	19 "	4 "	
"	26.	19 "	7½ "	
"	27.	20 "	4 "	
"	28.	20 "	8 "	Cold rain.
"	29.	21 "	4 "	
"	30.	21 "	9 "	
"	31.	22 "	6 "	Cold rain.
Sept.	1.	22 "	8 "	Cold rain.
"	2.	23 "	4 "	Clear and cold.
"	3.	23 "	8 "	
"	4.	24 "	1 "	
"	5.	24 "	2 "	
"	6.	24 "	4 "	
"	7.	24 "	8½ "	
"	8.	24 "	11 "	
"	9.	25 "	3 "	
"	10.	25 "	11 "	
"	11.	26 "	3 "	
"	12.	26 "	6 "	
"	13.	26 "	8 "	
"	14.	26 "	9 "	



L. B. CASE

SAGITTARIA. LINN.

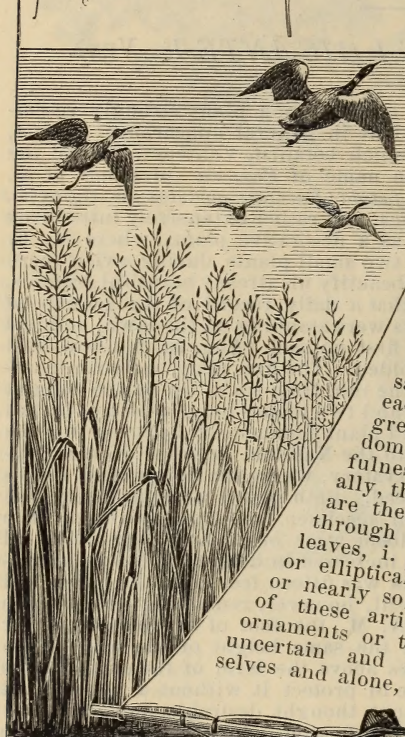
ORDER—*Alismaceæ.* Brongniart.

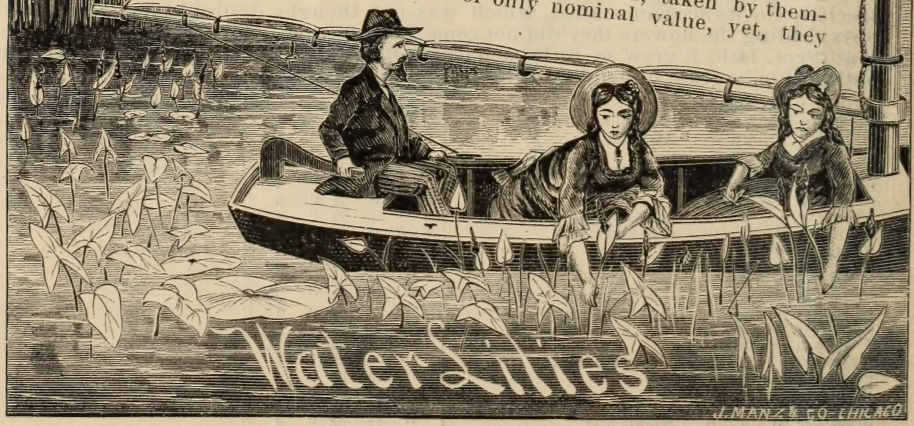
TYPE—*Sagittaria Sagittæfolia.*

ETYMOLOGY—From the Latin, *sagitta*, an arrow, because of the resemblance to the head of that weapon in the leaves of some species.

[Sixth Paper.]

PRIMITIVE man, in all ages of the world, has, either from accident or design, seemed to copy from nature, in preparing the few necessary articles of every day use, which are necessarily very simple and rudely made, and each one is often required to serve for a great variety of uses. The vegetable kingdom, as usual, is foremost in point of usefulness as models for their designs, and, usually, the leaf in some of its multiplied forms, are the patterns selected. In design, they pass through all the various changes of forms of the leaves, i. e., linear, (grass-like) lanceolate, oval or elliptical, cordate, (heart-shaped) peltate, (round or nearly so) and sagittate (arrow-shaped). Many of these articles are, probably, made for personal ornaments or tribal emblems, at least, they are of uncertain and doubtful uses, which, taken by themselves and alone, are of only nominal value, yet, they





are of great service in studying the development and progress of civilization and arts, from the infancy of the human race to the present day. We say "primitive man seems to copy from nature," wishing to emphasise the word *seems*, for no one will assume, at this late date, to know what their motives or designs were; all we know, is, the analogy is very striking, and whether they used the patterns set before them or not is immaterial to our comparison; suffice it to say, there certainly is a strong resemblance, and many of the forms of pre-historic relics have received the popular name of "leaf-shape" from Archæologists and pass into history as such. But the analogy does not stop here, for within historic times the vegetable kingdom has most certainly furnished the designs for some of the choicest gems of workmanship of classic times. The leaves of the *Acanthus* (*A. Mollis*) are known to have furnished the old Greek sculptor with the pattern for the capitol which surmounts the Corinthian Column, while the leaves of *Laurus Nobilis* furnished the material for the Wreath of Laurels, so superstitiously prized by the old Greek and Roman warriors, statesmen and victors, at their National Games, and which, without doubt, was superseded in the following ages by the Golden Wreath of Laurels, i. e., Imperial Crown, leaves of which were found in the old Tombs of the Kings at Mycenæ. This subject could be carried to a very indefinite length, but, whether we wish to or not, we must dismiss it, and see what we can learn of our chosen subject on Water Lilies for this number of the INDEX, *The Sagittaria*. Here we have, in mature specimens, the typical form of the foliage of all Water Lilies in their immature condition, viz, the arrow-shaped leaves, for the leaves of all aquatic plants, (except grass) so far as we know, are inrolled and present an arrow or spear-shaped point at the end of the stalks, in their growing or young condition, particularly, before reaching the surface of water, when they expand or unroll into their normal condition, viz, arrow-shaped, heart-shaped, oval or round, according to the species.

In the last number of the INDEX we felt called upon to offer an apology for our seeming stretch of imagination in applying the term "Water Lily" to the *Pontederia*, and now, we would again repeat the same expression in connection with *Sagittaria*, and would add in continuation, that there is no actual affinity or relationship existing between the different members of the group of so-called Water Lilies as we have arranged them together, for in a botanical nomenclature some are arranged near the first of the series, while others are placed near the last of the list of plants; according to the structure of the fruit and flowers, or to make the comparison as plain as possible, let us illustrate by saying: The *Nymphæa*, according to the scientific classification of Sir. Joseph D. Hooker, in his *Descriptive and Analytical Botany*, is arranged as the 10th botanical Family of plants, while the *Pontederia* are placed in the 46th Family (*Pontederaceæ*) with 35 distinct changes in the structure of the fruit and flower from the first family to the last one. They are simply a miscellaneous selection of aquatic plants, chosen from several distinct Families, whose habits and manner of growth seem to be very similar, but still without any scientific or natural characters in common with each other. As we have given the scientific characters of each Family, Genus or Species of the Water Lilies as occasion required, we must also add that of the *Sagittaria* here.

GENUS SAGITTARIA. LINNÆUS.

[*As elaborated by Engelmann, Hooker and others.*]

Marsh or aquatic, perennial, herbaceous, stoleniferous plants, with fibrous roots; and producing subterranean, tuberous corms, with a milky juice. STEMS, scape-like, radical, rosulate; sheathed at the base by the bases of the long, cellular petioles, of which the primary ones are usually devoid of a blade; the secondary ones usually have a long, linear blade, and all the subsequent ones develop a more or less perfect sagittate blade, except when they are submerged, when they are replaced by long, linear or spathulate phyllode. LEAVES (blades), floating or erect, of various shapes—linear, oval, cordate, oblong or sagittate, veined and reticulated with prominent cross veinlets, converging towards the top of the leaf, and united by secondary transverse nerves. FLOWERS, on long, angular, leafless scapes, usually in a 3-whorled raceme, from the axils of persistent, membranous bracts; monœcious, but having the fertile and sterile flowers on the same stock, the lower ones being fertile and the upper ones sterile. SEPALS, three, small, persistent. PETALS, three, a delicate paper-white, much larger than the sepals, imbricated in the bud, withering. STAMENS, numerous, rarely few. OVARIES, many, crowded in a spherical or somewhat triangular depressed head on a globular receptacle. ACHENIA, flat, fleshy, membranous marginal, winged and beaked.

Perhaps, nothing is more interesting than the study of the geographical distribution of plant and animal life, even to a person not particularly interested in botany or zoology; in proof of which, we would note the marked attention always paid to a traveler, both in the lecture room and, also, in the conversation, whenever treat-

ing of the flora or fauna of any strange or almost unknown country. Assuming, then, that our readers are as much interested in this subject as we are, we give a table of species and varieties, together with the localities where they are known to naturally exist; but must first say, that the *Sagittaria* present about the least distinct specific characters, probably, of any genus of plants. In the far north they are often small and dwarfed, while "as we approach the tropics the leaves (blades) are found two feet long, with stems nine feet in length; and each flower is often two inches across."—(*W. H. Dall.*) Consequently, we would, probably, be justified in saying many of the so-called species (given in the usual lists) are so closely allied in their specific characters, that oftentimes they are only varieties or abnormal forms, produced by climatic changes or changed condition of growth of only a few original species. Be this as it may, it is not our province to attempt a rearrangement, but, simply, to treat of the established order of nomenclature as already in existence. It may be well, however, to say in this connection, that Drs. Gray, Engelmann, and other careful students, are fast reducing the number of so-called species to their proper sphere, i. e., *varieties*, as time and opportunity offers.

Species.	Varieties.	Synonyms.	Habitat.	Date.
Acutifolia, Linn.		Not of Pursh.	West Indies.	1820.
Angustifolia, Lindle.		Not of Pursh.		1812.
Calycina, Engelmann.			North America.	1853.
"	Variety *Spongiosa*, Eng.		North America.	1875.
"	" *Fluitans*, Eng.		North America.	1875.
"	" *Grandis*, Eng.		North America.	1875.
Dontana.			Nepal, India.	1820.
Falcata, Pursh.		*S. lancifolia*, Michx. expart, not of Linnæus.	North America.	1812.
Graminea, Michx.		Simplex of Am. Authors, not Simplex of Pursh.	North America.	1812.
"	Variety *Acutifolia*, Pursh.	Not Linnæus.	North America.	
"	" *Platyphylla*, Eng.		North America.	1875.
Heterophylla, Pursh.			North America.	1822.
"	Variety *Elliptica*, Eng.		North America.	1875.
"	" *Rigida.*	*Sagitaria Rigida*, Pursh.	North America.	1806.
Lancifolia, Linn.		Not *Laneifolia*, Michx.	North America.	1787.
"	Variety *Falcata*, Push.	*Sagittaria falcata.*	North America.	
"	" *Ovata*, Red.		West Indies.	
Natans, Michx.			North America.	1812.
"	Variety *Lorata*, Chabman.	*S. Pusilla*, Pursh, expart.	North America.	
Obtusifolia.			China.	1804.
Pusilla, Nuttall.		Not *S. Pusilla*, Pursh.	Eastern U. S., N. A.	
Sagittifolia, Linn.			Europe.	Old.
"	Fl. Pl.		Europe.	
Sinensis.			China.	1812.
Variabilis, Engelmann.		*S. Sagittæfolia* of Am. Authors and Simplex, Pursh, expart.	North America.	1840.
"	Variety *Angustifolia*, Pur.	Not of Lindley.	North America.	
"	" *Diversifolia*, Eng.		North America.	1875.
"	" *Gracilis.*	Species *Gracilis*, Pursh.	North America.	
"	" *Hastata.*	" *Hastata*, Pursh.	North America.	1818.
"	" *Latifolia.*	" Latifolia, Willd.	North America.	1819.
"	" *Latifolia*, Fl. Pl.		North America.	
"	" *Obtusa.*	Species *Obtusa*, Willd.	North America.	1820.
"	" *Pubescens.*	" *Pubescens*, Muhl.	North America.	

In studying the geographical range of the *Sagittaria*, as presented in the above table, we find them "more or less abundantly distributed over the northern hemisphere, but rarer in the tropics."—(*Hooker.*) Sir Joseph Paxton gives no tropical species in his list, and Griseback, in his *Flora* of the *British West Indian Islands*, describes only two species, the habitat of which, he gives as "Jamaica and Cuba to (?) Guina, South America." The list of localities at our command is very meager and indefinite, consequently, very unsatisfactory; enough is known, however, to enable us to arrive at the following conclusion for North America: "Common throughout all the Atlantic States; abundant throughout all the central portion of the Continent, from the Gulf of Mexico to the Great Lakes; and very generally distributed along the Pacific coast, from California to British Columbia, inclusive. For its northern limit, we will quote from a private letter recently received from Prof. George W. Dawson, of the Canadian Geological Survey, who has very satisfactorily settled the question. He says: "Sir J. Richardson includes it in his list of plants, from the zone embracing from 45° to 55° on the eastern side of America, and 49° to 38° on the western coast. He marks it as common to the eastern wooded district of the eastern provinces (Canada) and the Pacific coast, but does not give it in his list of plants found north of the Arctic circle. The plant occurs in British Columbia, but I cannot give the precise localities. Prof. Macoun enters it as found in the Peace River and Athabasca county, as well as in British Columbia and the Saskatch-

ewan plains; which gives it a considerable northern range. Prof. Bell, who traveled last summer from the west end of Lake Winnepeg to York Factory on Hudson Bay, tells me that it is common on the rivers and lakes along that rout. It is not mentioned in a small MS. list of plants, collected by one of the Geological Survey parties on Lake Mistassini, (Lat. 51°; Lon. 75°;) some years ago, but I think it probable that it may go even so far north." "I could not absolutely assert that it does not occur in Alaska, but it has not been seen in eight years assiduous collecting."—(*W. H. Dall.*)

In the great economy of nature the *Sagittaria* have contributed their full share to the support of the human family in all parts of the world. "The Chinese cultivate *S. Sinensis* very extensively, for food, and they frequently represent them in their drawings."—(*Treas. of Botany.*) They also collect the tubers of the wild plants for food in California. "The feculent rhizoms of *S. Sagittæfolia* loose their acridity by desiccation, and serve as food to the Tartar Kalmucks"—(*Hooker.*) "Aquatic birds are fond of them, (tubers) and resort to favorite spots in Spring to feast upon them, when the Indians slay the birds for their own feasts; the tubers are generally as large as hens' eggs, and are greatly relished when raw, but has a bitter, milky juice, not agreeable to civilized man; this is destroyed in boiling, however, and the roots are rendered sweet and palatable; they are considered excellent when cooked with meat, either salt or fresh. To collect the roots, the Indians wade into the water and loosen them with their feet, when they float up and are gathered. They are of an oblong shape; in color, whitish-yellow, banded with four black rings."—(*U. S. Agricultural Rept., 1870.*) "They serve as food for the Indians of Washington Territory, under the name of Wappatoo."—(*Dr. J. G. Cooper, Vol. 12, Pacific R. R. Survey.*) "In shallow ponds and muddy margins of lakes and rivers throughout the Northwest, this plant, so variable in foliage and so abundant in distribution, furnishes an important article of native food, in the tubers which beset its fibrous roots. These tubers, (from the fact of their affording nourishment to the larger aquatic fowls, which congregate in such abundance about the North-western Lakes,) are called by the Chippewas Wab-es-i-pin-ig or Swan Potatoes, a name which has been naturally appropriated to several streams in this region.—Wabesipinicon, meaning the abode of the Swan Potatoe. The tubers frequently attain the size of a small hen egg, and are eaten by the Indians, with whom they are a great favorite. In their raw state they contain a bitter, milky juice, but in boiling, become sweet and palatable."—(*C. C. Parry in Owen's Survey of N. W.*)

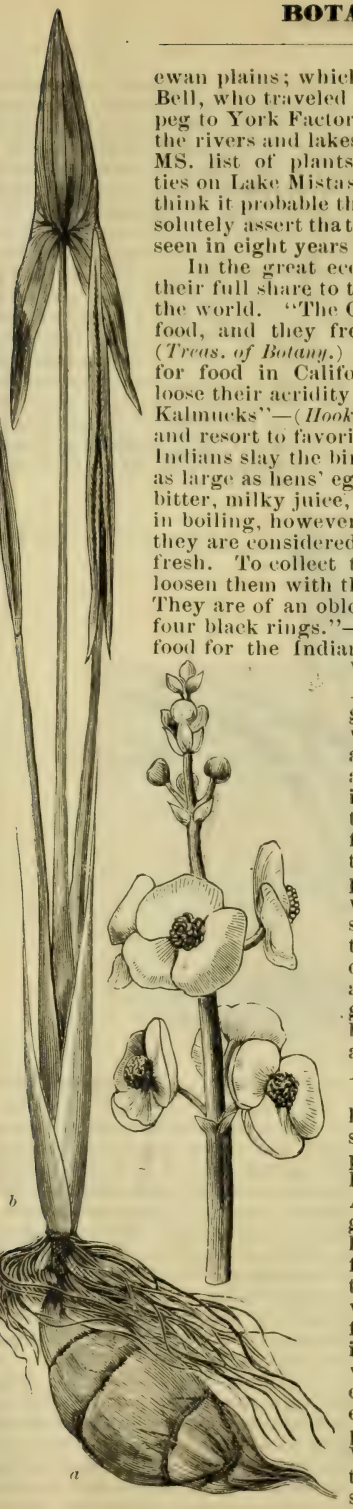


FIG. 107.

From the foregoing extracts, it will be seen how universally they have been employed to assist in the maintainance of the human family, and probably we know very little, yet, how extensively they have been employed in North America. As for their medical qualities, we find only a single recorded notice. Sir J. D. Hooker says: "they have been prescribed, but without good reason, for hydrophobia." Perhaps, our limited observation and knowledge of this particular plant, would not add anything of general interest to the fund already accumulated; but as some doubts exist in regard to their always producing a tuber, we will say: We supposed, as many others apparently do, that those found in the central and eastern portion of the United States, (North America) produced no tubers, but now find it is a mistake. We have collected them from a great many localities in Ohio, Indiana and Illinois, and find in early spring a solid, brittle, tuberous corm (Fig. 107) down deep in the earth, being the germ from

which the plant starts in spring. From the corm, (Fig. 107, a,) at the first approach of warm weather, starts a large, porous rootstock, reaching up to near the surface of the earth and there throws out innumerable fibrous roots, (Fig. 107, b,) which is the true crown from which spring the leaves, flowers and stolens, and is also the plant centre during summer. By the first of June the milky juice (starch, or saccharine, &c.,) has usually been absorbed by the new growth of the plant, and the corm is then a soft and flexible, or spongy, mass, reminding one of a sprouted and growing potato, while by the middle of July or first of August we could not find any corm, but found decayed masses which we were reasonably certain were the remains of the former corms. Fig 109 shows a cross section about natural size of a corm in early spring before it has lost its form and vigor. In our correspondence we find very few botanists or collectors that have any definite knowledge of corms being found on the Eastern or North Western plants, and all seem to regard the *Sagittaris* in these localities as not producing any tubers, for it is said that no herbarium in the country shows a specimen with a tuber attached that was collected in the Eastern portion of North America. This may be very easily explained by the fact that the crown of roots appears so perfect that collectors evidently concluded this to be all of the plant, or perhaps they were collected when the corm was absorbed by the growing plant. Now the above observation, we believe, will be found to be true in all parts of the country if collectors will *collect early and dig deeper.*

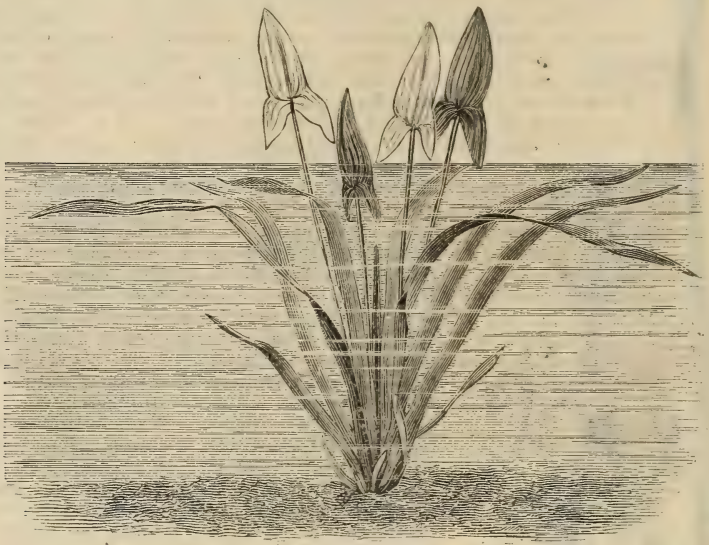


FIG. 108.—*Showing the Phyllodium.*

In addition to tuberous and fibrous roots, the *Sagittaria* present the feature of producing *Stolens* or long, creeping roots, (Fig. 110) just beneath the surface of the earth. They start from the stem, and usually from just above the fibrous roots, or from the upper portion of the stock covered with the fibrous roots, and creep out horizontally from the plant in all directions. We do not now recall a single genus of plants, that present so many different forms of development in each plant, as the *Sagittaria*. First, the roots are of three entirely distinct forms, (often on the same plant,) the tuberous, fibrous and stoloniferous. Next, the leaves are sometimes phyllodia, (submerged and riband-like) others are an elliptical, erect blade upon a tall, round or slightly angular stem, and, lastly, the leaf developed into its true form—arrow-shaped. Again, let us look at the flower; the lower ones are usually fertile, producing seed to perpetuate its kind, while the upper ones are sterile and barren: or each flower stock producing flowers with the sexes separate, and still on the same stock.

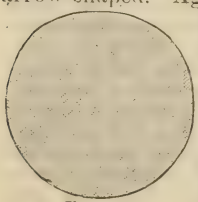


FIG. 109.

The flowers are borne on long, leafless, branched stems, (Fig. 107) well above the foliage, with pure white petals and a yellow centre, (stamens) usually single, but occasionally S. Sagittæfolia and S. Variabilis var. latifolia have been found growing wild with double flowers. The European Nurserymen offer these varieties for sale at from 6d. to 2s. 6d. each, which shows how readily they are increased, but we never heard of their being offered in

America. It is one of the queries of the plant trade, why these beautiful plants are not more extensively used by American plant growers; but we must unwillingly admit, that our people cannot, as a rule, be induced to endure the presence of *any plant* that is *so very common*, no matter how beautiful it may be, or how appropriately it may fill a certain space. For growing in an aquarium we find few plants better suited; and for a small lake or pond, it has few equals. In their natural condition they are found growing in soft, muddy or sandy ground; consequently, the conditions for a successful cultivation must be continued, viz: grown in soft, loamy soil, while if for pot or tub culture, a layer of coarse sand or small pebbles in the bottom of the tub, is always desirable for all kinds of aquatic plants; at the same

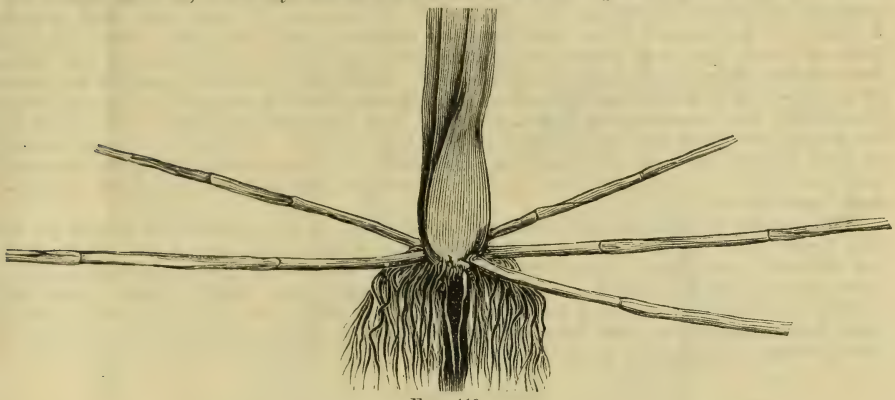


FIG. 110.

time, a layer of clean, fine sand, spread over the top of the soil, not only looks bright and cheerful, but very materially assists in purifying the water. Of course, the tropical species will not withstand any frost, but must be protected during Winter the same as all other tropical plants; but they can be allowed to remain in a neglected corner until they are required for the lawn or show-house.

Unlike many other species of plants, they survive the ill treatment and encroachment of civilization, and seem to flourish under its (to them) baneful influence. They were the last representatives, of the vegetable kingdom, to linger on the banks of the River Thames, in the heart of London, when that great metropolis banished dame nature from her presence, and substituted on her throne the modern conquerors—CIVILIZATION and COMMERCE.

ZIZANIA AQUATICA. LINN.

In the picture of Water Lilies, on page 44, our artist has very tersely introduced, as a background, a view of the growing grain of *Zizania Aquatica, Linn.*, the Wild Rice of North-western America, as it is often seen growing in the lakes, rivers and swamps; and which is in every way a fit companion for the *Sagittaria*, for many reasons. First, it is one of the most important native grains in the Northern portion of America, rivaling the *Sagittaria* in its economic value, furnishing a very important portion of the food of the North American Indians; while immense flocks of wild swan, geese ducks &c., depend almost entirely upon it for sustenance during a large portion of the year. Again, the *Zizania*, like the *Sagittaria*, is monœcious and contains both sexes on the same stock, the upper ones being male and the lower ones female. The picture represents the panicles of *Zizania*, as seen in Fall, with no grain adhering to the lower branches, but still retaining the semblance of grain on the upper ones. The upper portion, being male flowers, produce no grain, and the barren, pistillate, chaff-like flowers remain attached to the stock for a long time, often a year, but the fruitful (staminate) flowers, (awns) after ripening the grain, drop off at the slightest touch and sink to the bottom of the water, where they remain in nature's store-house of food for aquatic birds. This may explain, perhaps, the cause of the great abundance of game on our western lakes and rivers, at certain seasons of the year.

In the upper left hand corner of the same picture, (Page 44) we represent the various parts of the grain and flower of the *Zizania*. Letter *a* represents a single grain bearing branch, in flower; *b*, a single, perfect staminate flower; *c*, a single, ripe grain, as often seen, and *d* represents an awn (beard or chaff) enclosing the grain. The awn is usually about one and one-half or two inches long, adhering very persistently to the grain. The grain is enclosed in a hard, horny skin, from

one-half to three-fourths of an inch long, and contains an exceedingly large quantity of farinaceous matter.

Many attempts have been made to cultivate it in Europe, as an article of food, but it is now abandoned. It is still thought, however, by many economists, to be the future grain plant, intended by nature to produce the bread supply of the North. The Indians (Sioux and Chippawas) gather it by paddling their canoes through the standing grain, and shaking it off into their canoes as they go along. After being gathered it is "laid on scaffolds, about four feet high, eighteen feet wide, and twenty to fifty feet long, covered with reeds and grass; and a slow fire is maintained beneath for thirty-six hours, so as to slightly parch the husks that they may be easily removed; its beard is tougher then than rye. To separate it from the chaff, a hole is made, in the ground, a foot wide and one foot deep, and lined with skins; about a peck of rice is put in at a time; an Indian steps in, with a half-jump, on one foot, then on the other, until the husk is removed. After being cleaned, the grain is stored in bags. It is darker than Carolina rice. (From which it is entirely distinct, both botanically and economically.—Ed. Index). The hull adheres tightly and is left on the grain, and gives the bread a dark color when cooked. An acre of rice is nearly or quite equal to an acre of wheat, in nutriment. It is very palatable when roasted, and eaten dry."—(*U. S. Ag. Rep., 1870.*) The Sioux call it "*pshu*," and the Chippawas, "*man-om-in.*"

The *Zizania* are among our choicest aquatic plants for decoration, or would be if they were better known. They delight in a soft, muddy soil, and flourish in water five to twenty feet deep. They are best described as a stout, reed-like water-grass, with large, pyramid-shaped, spreading panicles, often two feet in length, growing in deep or shallow water and swampy borders of lakes, rivers, &c.; growing from three to ten feet high, with long, linear, lanceolate, flat leaves, from two to three inches long; ripening the grain in August.

WATERSIDE PLANTING.

BY SYLVESTRIS, IN "THE GARDEN," LONDON, ENG.

Nothing adds so much to the charms of a landscape, as the presence of a lake or a river, more especially, if their margins be planted with trees and shrubs. Sombre masses of Conifers, the feathery forms of Birches and Willows, and the fiery autumn-coloured masses of American Oaks and Maples, all contribute their share of beauty to such situations. It may be said that dark, impenetrable trees or groups should find no place on south sides, because of the gloomy shadows imparted to the water when so situated. One of the items not to be overlooked in such planting, is the hue which the trees assume in in autumn, a point next to form. Amongst the many American Oaks which become beautiful in autumn, may be named Quercus rubra, Q. Catesbei, Q. ambigua, Q. palustris, Q. coccinea, and Q. tinctoria. These flourish magnificently in moist ground, and, whether associated in groups or placed as solitary trees, yield charming effects, especially, when hanging partly over the water. Platanus occidentalis succeeds well in such places. Quercus pedunculata fastigiata is effective, either in the form of a group or singly: so, also, is Celtis australis, by itself or associated with varieties of Alnus. The Celtis is a good tree to plant where a rocky margin exists. Catalpa syringæfolia succeeds excellently with its roots partly immersed in water, and, when mixed with such subjects as Thuja occidentalis, or Juniperus virginiana, or some dark green Pinus, as a background, to set off its masses of white blooms, the effect is all that could be desired. In good soil it will reach a height of from fifty to sixty feet. Of Poplars, such kinds as Populus alba, P. alba nivea, the different varieties of P. balsamifera, (especially macrophylla and grandidendata) and P. græca, are indispensable. P. pendula should be used with caution, as, if planted in quantity, it seems to impart a sense of sadness to the landscape. The Poplars look best planted in groups with rapid-growing Conifers. The Tulip Tree succeeds admirably in moist situations, and its autumn tint is peculiarly pleasing. With American Oaks it makes a happy combination. There is a pyramidal variety which is useful for lightening up round-headed groups. Juglans regia laciniata is likewise a low-growing, pretty tree, as are, also, the American Ashes, such as Fraxinus juglandifolia, F. aucubæfolia, and F. longifolia, the latter having foliage of a violet colour; F. sambucifolia is a tree with a most distinct character; also F. lentiscifolia. The pendulous kinds of Ash make good waterside trees, and the nearer they are planted to the water the better they look.

NATIVE FRUITS.

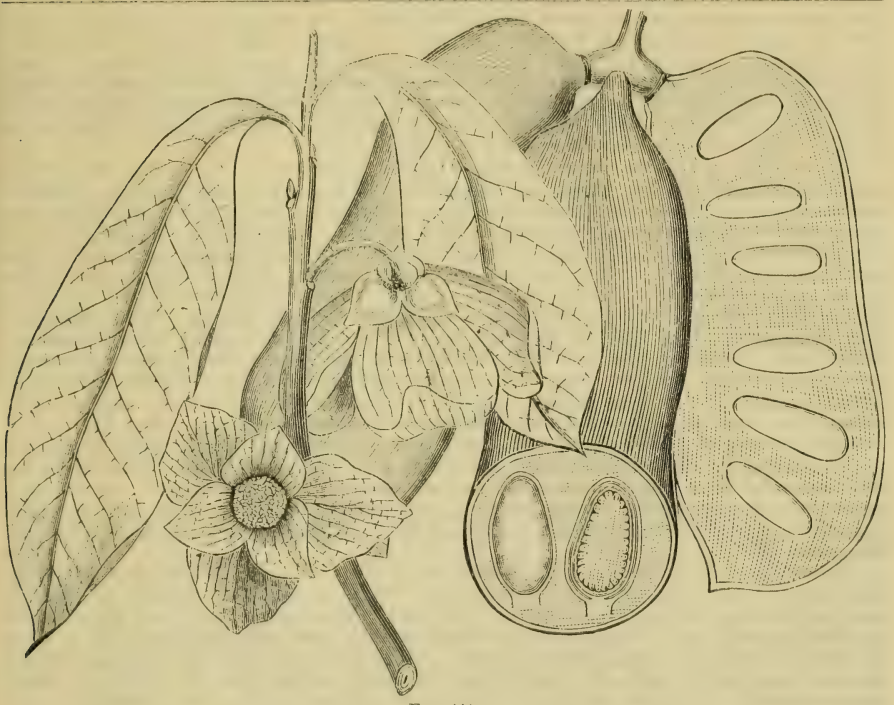


Fig. 111.

ASIMINA TRILOBA. Dunal.

PAWPAW OR CUSTARD APPLE.

WHO has not heard of the Pawpaw? It is one of the most familiar names for fruit, especially among the people living throughout the entire Ohio and Mississippi Valleys; but, common as it is, we venture the assertion that only a small portion of our readers ever saw a fruit, much less a flower. The name Pawpaw, however, is very indefinite, for there are two entirely distinct kinds of fruit known by this name; the South American Pawpaw —*Carica Papaya*—a most delicious fruit, nominally from Peru, and the North American Pawpaw—*Asimina triloba*—the subject of this article.

The best explanation for its name is given by Prof. Gray, which reads: "The popular name of Pawpaw was doubtless given to the fruit of *Asimina triloba*, from a fancied resemblance to the appearance or taste of the fruit, to the true Pawpaw of tropical America, (the fruit of *Carica Papaya.*) *Asiminier*, from which *Asimina* was formed, is the name by which the fruit was known among the old French Colonists. (*Gray's Genera.*)

Perhaps, it would not be amiss to try and make a point here, by calling the attention of those plant lovers, who are always complaining of hard names, to the necessity of scientific names to distinguish these fruits; for they are known the world over by their local nature names, and still have no relationship, in qualities in common with each other, in the natural order of the vegetable kingdom.

Some of the most interesting fruit of the tropics are produced by the botanical family *Anonaceæ*, and are known by the popular names of Alligator Pear, Custard Apple, Sour Sop, Sweet Sop, &c., many of which are among the most delicious fruits in the world, while a few, although not palatable, present some of the most exquisite forms in the vegetable kingdom. The *Anonaceæ* is exclusively a tropical or subtropical family, with the single exception of the *Asimina*, which, *per contra*, is a peculiarly temperate zone genus; three species of which, are found in the Southern States, (North America,) reaching from about 25° to 35° north latitude, while one species, *A. triloba*, the subject of this paper, reaches to a little above 42° 30′ north latitude, in the central portion of the continent, being recorded as growing at Ann Arbor, Mich.—(Winchell); and in Wisconsin and Mi nesota—(Dr. C. C. Parry). The three southern species grow only from about six inches (*A. Pygmæa*) to three feet (*A grandiflora*) high, and produce a small, worthless fruit; while *A triloba* grows from fifteen to twenty-five feet high, and its fruit, by many, is considered a very desirable one; but, to us, it always tasted like a tropical fruit, grown in an unfriendly climate, and destitute of the rich, luscious flavor we expect to find in them, but, of which they are void. They seem to prefer a cool, rather moist, shady situation, especially in the thickets near the banks of streams.

At the head of this article we give at Fig. 111 a picture of the fruit, flower and leaves of the *A. triloba*, which, disregarding the quality of its fruit, is certainly worthy a notice among our native fruits; especially, as we propose to review the whole series, as time and circumstances will permit. The portion of the bush we have selected for our illustration, is from near the end of a branch, and shows two leaves and two flowers in their natural form and position, but reduced in size. The leaves, as represented in the picture, are oblong, obovate, thin, from eight to twelve inches long, pointed, and covered with a rusty down when young, which, however, soon disappears. The flowers, Fig. 111, *c*, are of a dingy or copper-brown, about 1½ inches wide, nodding, produced from the axils of last year's leaves, and appearing with the leaves in April or May. Stamens numerous, short, and covering the torus with a solid, globular or pyramidal mass. Fruit ovate-oblong in form, smooth, pale greenish yellow, about 3 or 4 inches long, and ripening in October. Fig. 111, *c*, represents a bunch of fruit back of the leaves with one fruit cut horizontally from end to end, to give a horizontal section, showing, also, the seed *insitu*. The seeds are flat, arranged in two horizontal rows, and are enclosed in a fleshy aril. As we said before, the flesh to us is a sweet, insipid, pulpy mass, but, like many other native products, a taste is very readily acquired, so that, perhaps, we should say, "fruit edible, desirable?"

The wood of the *Asimina*, and, indeed, of all the *Anonaceæ*, is soft and yielding, (some species are, however, very elastic) so much so, that one species, at least, is used in the West Indies as a substitute for cork. The leaves, bark and wood of all the family emit a very disagreeable aromatic or fetid odor when bruised, but in some species it is more nauseous than in others. "The Malayans use the bark of several *Anonaceæ* reduced to pulp, for bruises and rheumatic pains, and the fruit of others as a stomachic. With the flowers of *Uvaria odorata*, and with other aromatics and *Curcuma* root, they prepare an ointment with which they annoint themselves to ward off fevers in the rainy season. European women in India, it is said, macerate these scented flowers in cocoanut oil, as a hair oil. The root of *Polyalthia macrophylla* is strongly aromatic, and the Javanese mountaineers use an infusion of it in eruptive fevers; they also use the fruit of *P. Subcordata* to allay nervous colics. *Artabotrys suaveolens* grows in nearly all the islands of the Malay Archipelago; from its infused leaves is prepared an aromatic medicine, which is very efficacious in inducing reaction during the cold stage of cholera. The aromatic fruit of *Xylopia grandiflora* furnishes the Brazilians with a condiment and a stimulating drug; that of *X. frutescens*, a shrub found throughout tropical America, is used as pepper by the negroes; that of *X. longifolia*, which grows on the shores of the Orinoco, is reckoned one of the best substitutes for quinine. *X. æthiopica* furnished the ancients with Ethiopian pepper, before black pepper was introduced from India. * * * The leaves of *Asimina triloba* are used to hasten the ripening of abscesses * * * and its seeds are emetic."—(*Hooker's Descriptive and Analytical Botany.*) "The seed of *Anona squamosa*, according to Royle, contains an acrid principle fatal to insects, on which account the natives of India use them powdered and mixed with the flour of Gram (*Cicer avietinum*) for washing the hair."—(*Treas. of Botany.*)

From the above it will readily be seen that this family of plants contributes a very important element to the health and comfort of man; hence, is of great economic value. As an ornamental tree or shrub the Pawpaw adds a charm to a large lawn from its peculiar aspect, being of dense and pyramid growth, with the leaves always gracefully drooping. Their hardiness to at least 42° north latitude will also add to its desirability for lawn planting; and, although the fruit is not relished by

all, it is esteemed by such a large portion of the people, that it is certainly worth cultivating, especially, as it seldom fails to produce a good crop every season. "The southern species, *A. Grandiflora*, produce a large, white, cap-shaped bloom, stained pink near the stem, with a sweet, insipid fruit, two or three inches in length and one inch in diameter, edible to some when ripe. *A Pygmæa*, a very common bush in Florida, growing in clumps, leaves drooping to the ground, flowering in April and May, in two rows along the underside of the limb, of a variegated white, red and purple color, very ornamental."—(*M. Coleman.*)

CLIPPINGS.

Mr. George Dines, who has had extensive experiments and observations on the formation of dew, finds that the depth of deposit in England, in an evening, rarely exceeds an one hundreth part of an inch; and that the average annual depth of the dew, upon the surface of the earth, does not exceed an inch and a half.—*Scientific American.*

In propagating *Coleus Chameleon*, it is best to use only the bright colored shoots, and to use a little wood-ashes in the potting soil. Cuttings struck in the Fall keep their color better, and make finer plants than those propagated at any other time; but they should be kept warm enough to keep them constantly growing.—*H. W. Hales, Ridgewood, N. J., in Gardeners' Monthly.*

Crooked young trees can be greatly improved, if not entirely straightened, by repeated longitudinal incisions, on the inner side of the bend, during growing season. Such treatment will increase the formation of wood in that side, and tend to straighten the tree.—*Nebraska Farmer.*

GATHERING AND SHIPPING FRUIT.

THE demand for fresh fruit in all our cities and towns has increased to such an extent, that fruit growing is now recognized as one of the most remunerative industries of the country. It is not every one, however, that succeeds as a fruit grower; at least, this is the inference arrived at, if we are to judge from the comparatively small number of successful growers; but, on the contrary, the successful one seems to be the exception, while the unsuccessful one, or only indifferently successful one, is the rule. A great variety of causes must be assigned as the reason, some of which are beyond human agency to control; while others are usually the immediate effect of inexperience or neglect. Again, all portions of the country are not equally well adapted to fruit culture, for horticulturists generally recognize the fact that there are numerous well defined fruit centers, each one adapted to some special kind of fruit. Still, all portions of the country, will, with proper care and cultivation, produce a reasonable return in fruit for the labor bestowed upon it.

We have, north of the 37° 30′ north latitude in America, three distinct localities especially adapted to Peach culture; viz: The states of New Jersey and Delaware in the East; the Western shore of Michigan, from near the 42° to the 43° north latitude, in the North-West; and the Southern portion of the State of Illinois, in the great Mississippi Valley Basin. The Eastern Peach belt is only about one hundred miles long by thirty miles wide, and yet it furnishes the great majority of Peaches for the New York, Boston, Philadelphia and Baltimore markets, as well as a large proportion of this fruit in all the smaller cities and towns of the North and West, nearly to the Rocky Mountains.

It would be almost impossible to obtain any thing like a definite estimate of the quantity of fruit produced at all the great fruit centers, particularly, as some of the fruit growers are inclined to guard their interest with a jealous care, and often suspect all inquiries regarding their crops to be of a personal nature—perhaps, conflicting with their interests. We have secured, however,—thanks to our horticultural friends—a very fair estimate of the fruit products, either in the amount shipped or the quantity of land employed in growing the crops, so that a very good idea can be gathered of the magnitude of the business, by the following figures.

In addition to the figures taken from the Custom House books at Benton Harbor, Mich., must be added about 10 per cent., as the amount shipped by Railroad, (including Express.)

STATISTICS OF PEACHES, BERRIES, AND MISCELLANEOUS FRUITS, SHIPPED BY DELAWARE DIVISION OF PHILADELPHIA, WILMINGTON AND BALTIMORE R. R. [OFFICIAL.]

	1875	1876	1877	1878
Berries in Quarts	7,712,256	7,882,912	604,712	6,993,312
Peaches in ⅝ Bush. Baskets	4,330,036	1,144,934	2,133,790	463,173
Cherries in Quarts	116,384	153,120	.....	.....
Apples and Pears in Barrels	6,211	6,883	6,318	1,581
Apples, Pears and other Fruits, in other packages, in Bushels	41,945	17,386	17,810	34,416

APPROXIMATE AMOUNT OF FRUIT SHIPPED FROM THE ST. JOSEPH (MICH.) FRUIT BELT, 1878.

	Berries in ½ Bushel Packages.	Peaches and Grapes in ⅛ Bush. Pkges.	Apples in Barrels.	Miscellaneous Articles in Boxes.
Via C. & W. M. R. R.	63,438	75,984	53,428	2,993
Via Steamboats	95,857	113,976	80,142	4,489
Total	159,295	189,960	133,570	7,482

AMOUNT OF FRUIT AND VEGETABLES SHIPPED FROM SOUTHERN ILLINOIS FRUIT BELT, 1878. [OFFICIAL.]

	From Cobden.	From Anna Station.	From Alta Pass.	From Villa Ridge.
Via Express	672,550 lbs.	76,850 lbs.	84,040 lbs.	42,000 lbs.
Via Fruit Train	7,804,227 lbs.	1,486,483 lbs.	36,829 lbs.	1,364,780 lbs.
Total	8,476,777 lbs.	1,563,333 lbs.	120,869 lbs.	1,406,780 lbs.

SANDUSKY, OHIO, GRAPE PRODUCT, 1877. [OFFICIAL.]

[This Belt comprises Erie and Ottawa Counties, principally; Kelly Island is in Erie County, but all the other Islands, viz. Put-in-Bay, North, South and Middle Bass, Catawba Islands, &c., are in Ottawa Co.]

	Number of Acres in Vineyard.	Pounds of Grapes produced.	Gallons of Wine made.
Erie County, Ohio	1,374	2,059,648	233,676
Ottawa County, Ohio	1,862	3,004,904	183,475
Total	3,236	5,064,552	417,151

STATEMENT OF FRUIT SHIPED FROM BENTON HARBOR, MICH., 1878, VIA LAKE. [FROM THE CUSTOM HOUSE BOOKS.]

Apples in Barrels.....57,616	Peaches, ¼ Bushel Baskets.....26,283
Strawberries in Crates (32 qts.)....32,348	Pears, ¼ Bushel Baskets..... 2,229
Cherries in Crates (32 qts.)..... 2,973	Quinces, ¼ Bushel Baskets..... 230
Raspberries in Crates (32 qts.)....10,866	Grapes, ¼ Bushel Baskets.....12,648
Blackberries in Crates (32 qts.)...16,473	

The year 1878 is known among fruit growers as an "*off year*," which is best understood by saying "a year of a bountiful crop is usually followed by one of a small yield, which may be explained by the well known fact that fruit trees become so far exhausted by a heavy crop that it requires two years to renew its lost vigor. A good comparison is furnished by the following figures of fruit and vegetables shipped from Anna Station, Ill.: In 1877, 2,427,690 pounds; in 1878, 1,579,610 pounds.

The figures from Southern Illinois are, however, rather incomplete, because the figures of shipments, as furnished by Railway and Express companies, are the sum total of both fruit and vegetables, which could not be separated. From another source we learn that from the commencement of the season up to June 1st, 1878, there were shipped from Cobden, Ill., 45,500 crates of strawberries, of 24 quarts each,

equaling 69,200 quarts, or 776 tons of fruit; and during the season (1878,) from the same locality was shipped 100,000 boxes, holding a third of a bushels of tomatoes.

In regard to the amount of land employed as orchards, we learn that Cobden has in its immediate vicinity 4,960 acres, viz.: 1,200 in strawberries, 1,400 in peaches, 1,500 in apples and 860 in miscellaneous fruit. But it is the efforts of the single individuals that makes up this wonderful sum total. Let us see a few figures lately clipped from the *American Agriculturist*. It says: "A. H. Carey, of Wyoming Station, Del., has 400 acres in orchards, including 15 in pears, 75 in peaches, 30 in blackberries, 12 in raspberries and 10 in strawberries. J. G. Brown, same place, has 400 acres in orchards, including 200 in peaches, and 50 in raspberries. James A. Ross, Bridgeport, Del., has 1,200 acres in orchards, including 40 in pears, 350 in peaches, 75 in peaches, 75 in raspberries, 25 in strawberries. From another source we learn that Robert McKinstry, of Hudson N. Y., has on his fruit farm has 24,000 apple trees, 1,700 pears, 200 plums, 500 peach trees, 4,000 cherry trees, 200 crab apples, 1,500 vines, 6,000 currants." We might continue these lists to an indefinite length, but enough has been given to convey an idea of the enormity of the business, even in America.

Now, let us see what we can learn from our English cousins about their fruit for market. In a recent number of *The Garden* we find: "From Kent comes the chief supplies of small fruit for preserving, and the quantities of these sent annually to London and other large towns are enormous. People, indeed, unacquainted with fruit culture on a large scale, can form no conception of the vast plantations of orchards and bush fruit that are to be found in Kent. About Swanly and its neighborhood, from any hill-top, may be seen miles of the higher-lying ground crowned with Gooseberries, Currants and Raspberries. * * * * Some growers, in good seasons, have been known to gather more than 3,000 bushels of Gooseberries. * * * * * * Raspberry picking is performed by women and children, each of whome carries two baskets, of the form of a flower-pot, one in front and one behind, slung over the shoulders; these, when full, are emptied by boys into wooden tubs, provided for the purpose—that is, if the fruit is intended for preserving; but, if for Covent Garden, baskets are used. Few Raspberries, however, come to Covent Garden, compared with what go direct to fruit preserving depots. * * * Many single growers contract with manufacturers to supply them with ten tons each. Few of the Kentish Raspberries are picked with stalks attached to them; most of the fruit seen in Covent Garden furnished with stalks, is supplied by growers near London, who pick their finest fruit for that purpose, and put them at once in small punnets lined with leaves, which are then packed in quantities, in layers one over the other, into large, square, wooden boxes, or chests made expressly for the purpose."

Good, wholesome fruit is one of the greatest luxuries within reach of any people; in fact, it is almost an indispensable necessity to good health, because the human system naturally craves it; while stale fruit is exactly the reverse, and, really, is more injurious to the system than all the benefits arising from the use of good, fresh fruit; but, if people cannot get it fresh and healthy, they will obtain stale fruit as a substitute. What we usually call ripe fruit, is, in reality, only the first step in decomposition; and, when fruit is shipped in bulk without due regard to ventilation, it heats and ferments, or sours, and is then almost a deadly poison to the human system.

Now, the price of fruit, as well as every other product, is governed, very materially, by its quality; and fruit growers who uniformly deliver large, clean and sound fruit, strictly adhering to a fixed determination to maintain a high standard of excellence for it, will, as a matter of course, secure the best class of custom. It is a well known fact, that too many of our fruit growers cannot resist the temptation of putting in just a few inferior or unsound berries, or a few knotty, wormy or windfallen apples, pears, peaches, &c., to fill up a certain desired quantity, which might otherwise have been quite choice; but, dealers soon learn that a very few defective specimens, in an otherwise choice basket, will lower the grade of the whole lot, and, in his second purchase, the merchant will seek a new grower for his supply. This is a very important question to fruit growers, which they cannot afford to shut their eyes to in these days of strong competition.

In the last number of the INDEX, (April, 1879,) page 36, Fig. 101, we gave a cut of a fruit protector, which is a step in the right direction; for it is an absolute necessity to keep the fruit clean to make it marketable—not by washing it, for wetting fruit usually spoils it for market, but by keeping it clean all the time it is growing.

The purpose of this article, however, was not "how to grow fruit," but, "how to gather it and place it before the people ready for the table," and, in a good marketable condition. And right here, we wish to acknowledge the favors from our many horticultural friends, for the use of cuts to illustrate this article, which will enable us to give a better idea of the subject than words will do.

Fig. 112.

The usual mode of gathering all kinds of fruit is by *hand picking*, which is slow and tedious, with most kinds of berries, at least; but, a few mechanical Fruit and Berry Pickers are now offered for sale, which are of permanent value. Fig. 112 is a Fruit Gatherer, owned by William Pickett & Son, Chicago, Ill., and presents many advantages of great value, for gathering large fruit, particularly, as it gathers the fruit without bruising or injuring it in the least. Its length enables a person to select a good position, and, without changing it, to gather from a large portion of the tree, thereby saving a vast amount of time by not having to continually change positions, as well as by retaining the fruit in the adjoining sack until a quantity is gathered. Fig. 113 is a Berry Picker, owned by L. B. Silver, Cleveland, Ohio, and consists of a neat little India-rubber cup, artistically fitting the hand, holding about a half pint, and obviating the liability of squeezing or in any way injuring the fruit while picking. Fig. 114 is a peculiarly constructed Grape Cutter, owned by A. A. Weeks, 82 John Street, New York City, and is the most complete article, not only for cutting off the bunches of grapes without injuring the fruit, but, also, for cutting flowers, especially, roses, etc. These illustrations are all so plain that the eye, at a glance, comprehends the working of these three articles.

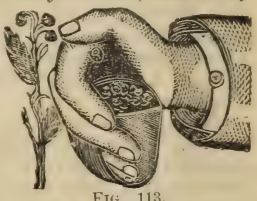


Fig. 113.

So much for inventions to assist in gathering fruit; but, here, the care and anxiety about fruit growing only just begins, for no matter how choice and fine the fruit may be when freshly gathered, it must be taken to our large cities and towns to find buyers, and how to get it there is the most important question. The old mode of shipping was in boxes, more or less systematically made but all objectionable from lack of a known standard of size for large fruit, while small fruit usually fermented before the dealer could possibly dispose of them. The Standard boxes, however, ¾ bushel (Fig. 115) and the bushel box, (Fig. 116) were soon adopted and still continue the favorite for shipping all kinds of such coarse and heavy fruit and vegetables as Apples, Pears, Tomatoes, Sweet Potatoes, &c., but are usually abandoned for Peaches, Plums, Cherries, Grapes, &c., which are now more extensively shipped in baskets that hold about one peck. Several patterns are in use in different portions of the country, each fruit center, apparently, adopting its own favorite form or make of baskets. They are expected to hold a peck of fruit, but it requires the fruit to be rounded up to make a peck, which

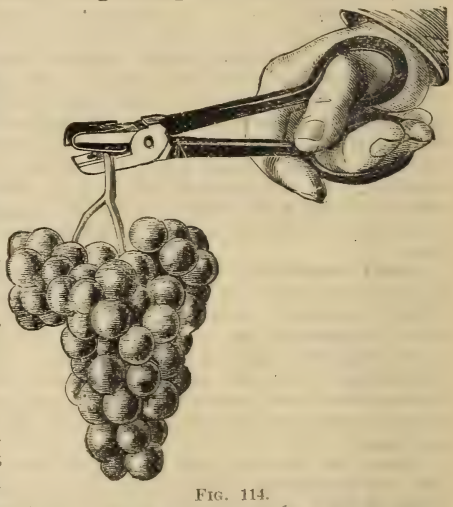


Fig. 114.

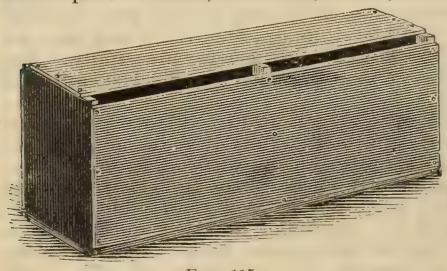


Fig. 115.

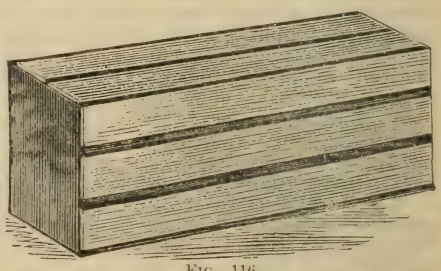


Fig. 116.

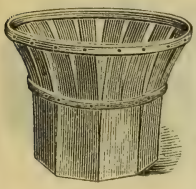


Fig. 117.

is seldom done, consequently, they usually hold only one-fifth of a bushel. Fig. 117 shows the Michigan Fruit Basket, as manufactured by the Union Bag and Paper Co., of 53 & 55 Michigan Avenue, Chicago, Ill., which, for many years, was the form adopted by the Michigan fruit growers. The baskets, when filled with fruit, were always covered with a piece of tarleton, millinet or mosquito bar, of various colors, principally green or some of the shades of red; the brightest scarlet, however, gives the fruit a much richer appearance than any other color. Fig. 118 shows an improvement adopted by A. W. Wells & Co., of St. Joseph, Mich., on the old form of open baskets. It is the so-called Rail Road Cover, made of the same material as the basket, and fitting it nicely, and which, when securely fastened by wire or strong cord, facilitates the handling and storing. To meet the further demand for a convenient basket, A. W. Wells & Co. have added a wire handle sixteen inches long, hooked at each end through the rim of the basket. (Fig. 119). This enables the purchaser to carry it with ease, which is always an inducement to take something home as a pleasant surprise. The dealer usually refunds a small sum of money for the return of the basket, which he returns to the fruit grower in nests similar to Figs. 129 and 131. For small fruit the bushel drawer is very extensively used, especially, around Cincinnati, for each locality has its own particular pattern. The drawers are two inches deep, and carry Plums, Cherries, &c., very satisfactorily, and, as they can be packed in a frame together, they are well ventilated, are easily handled and occupy only a small space, which is a very important item to shippers. We must

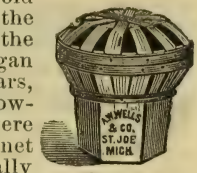


Fig. 118.

Fig. 119.

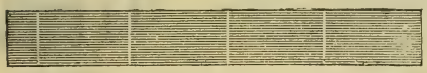


Fig. 120. *Hallock's Patent Qt. Box, in flat, band and bottom.*

Fig. 120 *Leslie's Patent Qt. Box, in flat, band and bottom.*

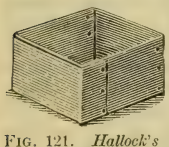


Fig. 121. *Hallock's Qt. Box.*

say, however, these drawers are very unsatisfactory to retail dealers and buyers of choice, soft fruit, such as Strawberries, Raspberries, Blackberries, &c., as the berries usually present a bruised appearance when prepared for the table, caused, in a great measure, by the extra handling or difficulty of getting them from the drawers. The most satisfactory mode of shipping small fruit is in small baskets and boxes, usually holding one quart; however, some hold only a pint. Several patterns are now in use —all good—and it would be almost impossible to praise one more than another.

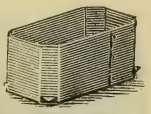


Fig. 123.

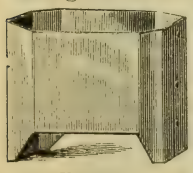


Fig. 124.

Figs. 121 and 123 represent two patterns of quart boxes, manufactured by the Box and Basket Co., of Cairo, Ill. These boxes are made of one-fifth inch lumber, and are prepared, at their factory, for folding together and fastening by the fruit grower; and, while in the unfinished condition, shown at Figs. 120 and 122, they occupy so small a space that it costs only a trifle to ship them by express to all parts of the country. Berries carry with perfect safety in these boxes, and are presented to the consignee in excellent condition. Another new and very practical berry box and fruit basket (Fig. 124) is made by the Union Bag & Paper Co., Chicago, Ill., and is made of water-proof

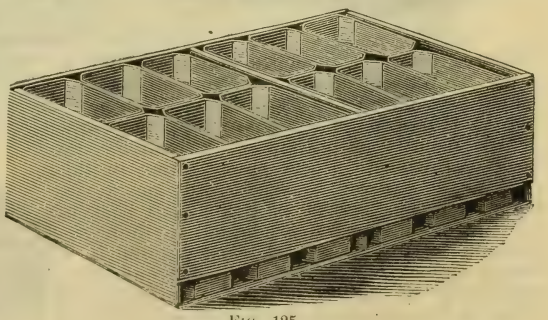


Fig. 125.

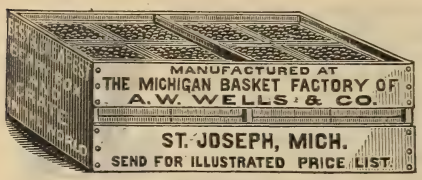


Fig. 126.

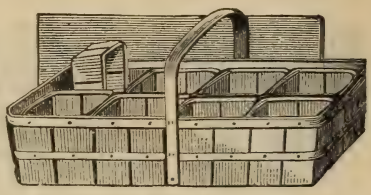


Fig. 127.

straw board. They are cut and scored at the factory, ready to be tacked together at the fruit grower's home. Many advantages are claimed for these over the wooden boxes, but, as they are comparatively new to shippers, the points of superiority are

Fig. 128. *The Star Basket.*

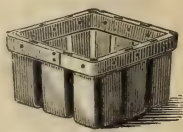
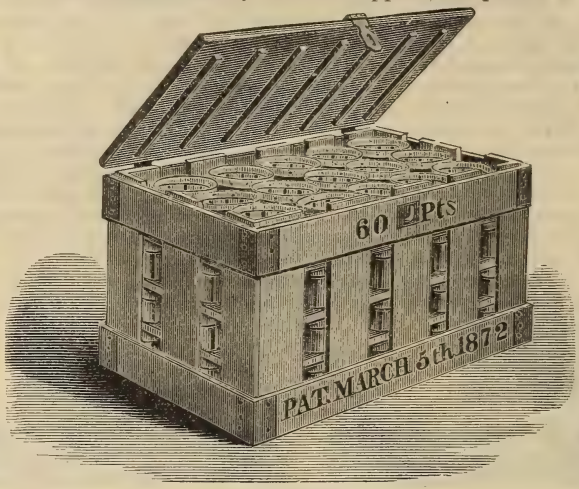


Fig. 130. *Delaware Qt Basket.*



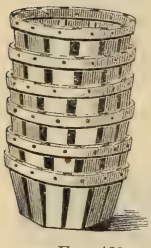


Fig. 129.

Fig. 132.

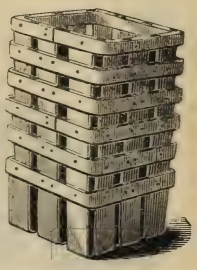


Fig. 131.

not yet fully attested. For shipping to market, some fruit growers use a very ordinary box, as a crate, similar to Fig. 125. If it is advisable to give the berries more air, such a box as Fig. 126 is often made. These are very cheaply constructed, and the cost is small. They serve their purpose for a short journey very well. Fig. 127 represents a basket made by I. C. Wood & Brother, Fishkill, N. Y., which is the favorite with many shippers, notably, E. P. Roe, Cornwall-on-Hudson, N. Y. Perhaps, one of the most satisfactory collection of shippers supplies are those made by William Parry, Cinnaminson, N. J., himself, one of the heaviest fruit shippers in the country. Figs, 129 and 131 represent baskets nested together to return to the fruit grower. Probably, the most satisfactory mode of shipping, is in some of the patent frames or crates similar to Fig. 132, which is made by William Parry, of Cinnaminson, N. J., fastening with a lock and key, which prevents the petty pilfering, so annoying to shippers. The commission men and dealers usually refund a nominal sum for the boxes and baskets, which they return in the crate to the grower, to refill. For the grape trade, a special series of boxes and baskets are prepared, especially adapted to their requirements, for, as grapes are enclosed in a tough, dry skin, ventilation to prevent heating while in transit, that most small fruit requires in a measure, is unnecessary; hence, the urgency does not exist for the great care

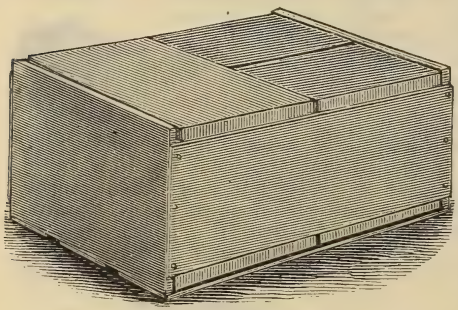


Fig. 133.

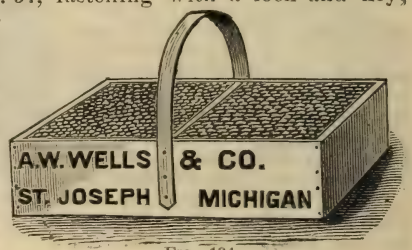


Fig. 134.

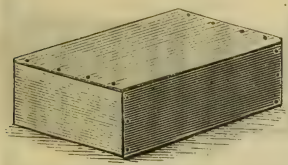


FIG. 135.

and precaution so necessary for other fruit. Fig. 134 represents the ordinary handled grape box, manufactured by A. W. Wells & Co., St. Joseph, Michigan, which is very extensively used. Fig. 135 represents the the six-pound grape box, and Fig. 133 the twenty-four-pound grape shipping crate, made by the Cairo Box and Basket Co., of Cairo, Ill. Of course, all these articles are made by other firms than those mentioned above, but, as they have been long in the business, their patterns and patents are recognized as of great value by all extensive shippers and growers, and as they always keep on hand a full line of FRUIT SHIPPERS' SUPPLIES of all kinds, we would recommend any one in need of their goods to correspond directly with them before ordering elsewhere. We would also respectfully call attention to the "Horticultural Directory" published in each number of the INDEX, as it contains a variety of business cards pertaining to floriculture and horticulture.

In the next number of the INDEX we propose to give a short sketch of the progress made each year in preparing fruit for the table,—both fresh, dried and preserved—and shall be pleased to receive notes and estimates from manufacturers, as well as descriptions from inventors of the articles now in use for labor saving in this particular branch of industry; for it is very essential to have fresh fruit taken care of without any delay, in order to successfully compete with each other in the same business. With this explanation our friends in the business, as above stated, may expect to be troubled with questions which we hope will be cheerfully answered. Our limited space will not allow of a satisfactory description of any of the new inventions, but we have had so much real pleasure in using Bunker's Strawberry Huller, (Fig. 136) manufactured by A. S. Bunker, Lawrence, Mass., that we must notice it now, even if the season is so advanced that they will not be very useful this season. We have tried it to our own satisfaction and have no hesitancy in saying it must be a success, but cannot so well describe its value and working as by quoting from the American Agriculturist, which says: "Where strawberries grow with a distinct neck the operation of hulling is easy, and no aid is required to the fingers of the operator. But many varieties, especially those that produce very large berries, have the hull (or more properly speaking, *calyx*,) so closely attached to the fruit, that it is troublesome to remove it by the use of the finger and thumb, and when, as is often the case with the large berries, they grow in the "cockscomb" shape, the calyx is so malformed, and partly covered by the shoulders of the fruit, that it is impossible to remove it neatly without using a knife. It consists of a pair of forceps, or tweezers, of the form shown in the engravings; they are apparently of brass, and silver-plated.

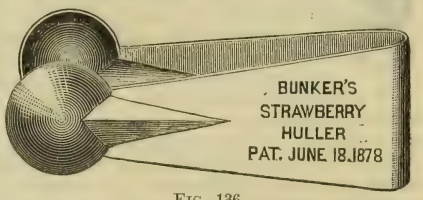


FIG. 136.

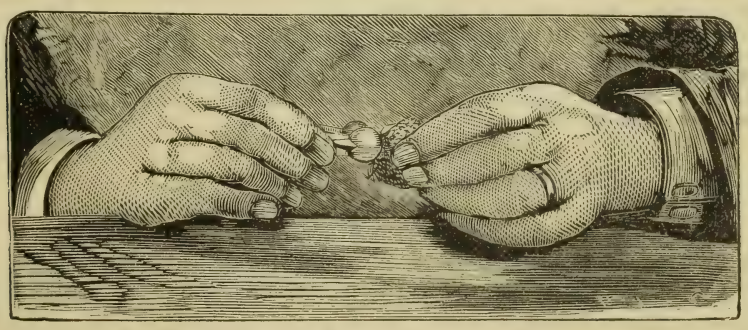


FIG. 137.

Like most useful affairs, it is very simple, and its peculiar form allows it not only to save the fingers where the hulls present no especial difficulty, but with troublesome and coxcomed berries, it allows the calyx to be cut out neatly and quickly and leave the berries in a presentable condition." Mr. Bunker has very kindly sent us his cuts to illustrate this article; one, Fig. 136, showing the huller, while Fig. 137 represents the article in use. They are so very cheap, (ten cents each or ninety cents per dozen,) that we hope to see a good supply in every family, and know they will find plenty of use.

[We would request any one having new or strange Plants, to send us a notice for publication in these columns.]

NEW AZALEAS.

NEW DOUBLE FLOWERED INDIAN AZALEA, EMPRESS OF INDIA. A. Van Geert.

THIS splendid new double flowered Indian Azalea may be considered as the finest variety sent out of late. Its sterling merits do not only reside in the decided beauty of its colour and the correct shape of its flowers, but in its fine, dark foliage and nice, compact growth as well. No other variety buds more freely than it does, and it will certainly make a first class plant, both for market and exhibition purposes.

The flowers measure four inches in diameter, and may become larger still under skillful treatment. The outer petals are elegantly undulated and slightly recurved outwards, showing beautifully forward the numerous central petals. The ground colour is a warm salmon rosy tint, nicely enhanced by a pure white ribbon, running along the undulated outer part of every petal. A blotch of carmine spots radiates from the center of the flower towards the upper petal. We think there is no exaggeration in terming the sight of a well flowered plant as truly grand.

At the International Show held at Ghent, in April, 1878, where this fine Azalea was exhibited for the first time, it obtained the first prize, under the provisional name of "*Heros des Flaundres*; and all our continental growers were unanimous to confirm the decision of the Jury. Since then, at the meeting of the Floral Committee of the Royal Horticultural Society, held on the 11th of March last, it obtained the highest award it could get, viz: A first class certificate.

These two judgements confirming our own opinion respecting the merits and excellence of the plant, we have thought ourselves authorized to dedicate it to the Most Gracious Sovereign of its original home, THE EMPRESS OF INDIA.

NEW WHITE DOUBLE FLOWERED INDIAN AZALEA, LOUISA PYNAERT. A. Van Geert.

THIS new, grand Azalea is the largest and the best shaped white, double flowered variety extant until now. It is unsurpassed in size, the diameter of its flowers being quite five inches. They are of a very firm and consistent texture, and, therefore, will be exceedingly useful for bouquets and other floral purposes. As an exhibition plant it will make an astonishing feature through the immense size of its flowers.

It originates from one of the most successful Ghent grower, the late Mr. L. Brugge, who has raised a good many of the best varieties now in commerce.

Ghent, Belgium, April 1, 1879. A. VAN GEERT.

ANEMONE NEMOROSA. FL. PL.

A NEW DOUBLE ANEMONE.

A young botanist—a friend of mine—found in one of his rambles through the forest, a year ago, a native *Anemone* (*Anemone Nemorosa*) with very double flowers. He was so charmed with the beauty of the flowers that he removed the roots to the flower garden, and this season the plants have grown and bloomed handsomely—as large and double as a Daisy—i. e., as large as a nickel, and pure white. The plants seem to thrive under cultivation. I was surprised to find the flowers remain so long in bloom; several single flowers often lasting *several weeks* on the plants. I believe flowers of this, and of the native wind-flower, are occasionally met with, having semi-double flowers, but I have never seen or heard of one so double and large as this one. It is to be hoped that this may be the beginning of great improvements in our native species, until they shall vie in variety and beauty with the foreign sorts. Even the single variety is a very handsome plant in its native forest home.

Dunreith, Ind., May 1879. E. Y. T.

[We solicit the privilege of publishing extracts from correspondence, of interest to the general reader. Correspondence upon Botanical subjects respectfully solicited.]

HAARLEM, HOLLAND, April 26, 1879.

MR. L. B. CASE.—*Dear Sir:* I beg leave to inform you that the April number of the BOTANICAL INDEX, and your kind letter, came safely to hand. * * * *

The illustrations you have got from Mr. Vick are very good, indeed. They give a good idea how bulbs are treated.

As soon as I can tell you with certainty about the Fall crop of the bulbs, I shall do so, and hope it may be in time; but it depends on the weather. I can tell you now that Hyacinths will not be cheap, for the prices of our Spring auctions are very high. The stock of some growers has suffered badly, so they want to restore it, and buy bulbs dear for cultivation; but withhold them at the same time from the market. With best regards, I remain, dear sir, yours respectfully,

C. E. VAN GOOR.

HAARLEM, HOLLAND, May 18, 1879.

MR. L. B. CASE.—*Dear Sir:* I beg leave to inform you that I have sent to your address my Calalogue for Dutch Bulbs and Flower Roots, for 1879, which I hope will come safely to hand.

I am pleased to say that Hyacinths will be a great deal better than last year. They look strong, and only want some warm days, to get right. The prices of the leading sorts and mixtures are a little higher than last year, because, in our Spring auctions higher prices were paid, in order to secure more stock, and, also, because the general stock has suffered badly for the last two years. It is my idea that Hyacinths will be good in quality but not abundant. Tulips will be very good, and there is a good stock; so my prices for that article are low, to which, I take the liberty to call your special attention. All other kinds of bulbs, of which something could be said, look well, so that I expect there will be quite enough for the market, except *Convallaria Majalis* (Lily of the Valley) *Clumps*, whereof, the early *good* ones will be scarce.

I hope these few communications may be useful for your BOTANICAL INDEX. Receive, dear sir, for the second time, my sincere thanks, &c., and believe me,

Yours, very truly, C. E. VAN GOOR.

HAARLEM, HOLLAND, May 21, 1879.

L. B. CASE, ESQ.—*Dear Sir:* Your estimable favor of April 3d, came duly to hand. * * * * I take this occasion to hand you my new list for this season, and take the liberty to recommend it to your special attention. I trust you will find that my prices can rival with those of other trustworthy houses. My stock of Tulips being very extensive, my prices are especially low. Perhaps, it may be of some interest to the readers of your BOTANICAL INDEX, to know that bulbs promise to be extraordinarily bountiful this season; and, that Hyacinths have quite recovered from the disease, and the crop will exceed any of the last five years.

I remain, dear sir, yours, truly, J. J. VAN LOGHEM.

WINNEBAGO, WISCONSIN, May 10, 1879.

L. B. CASE, ESQ.—*Dear Sir:* I notice in your BOTANICAL INDEX for July 1878, an article on the "*Nelumbium Lutea.*" You request information in regard to localities found in addition to those you name. It grows here in abundance, in at least three localities near Oshkosh, (44° north latitude.) I have gathered the flowers every year, for six years, from a small bay in Lake Winnebago, about four miles north of Oshkosh City, and on the Hospital farm. There is, also, an abundance of *Nymphœa tuberosa*. I have been told that the Indians, years ago, gathered the tubers of the *Nelumbium lutea*, and also the seeds, in quantities.

Yours, &c., M. F. BUTLER.

P. S. Did you ever hear of this locality growing the *Nelumbium?* M. F. B.

PRATTEVILLE, CAL., May 20, 1879.

MR. L. B. CASE.—*Sir:* Arriving home, a few days since, from a short trip in Indian Valley, I found your kind letter awaiting me. I hasten to answer your ques-

tions in regard to the *Sagittarias*. There are several kinds of them growing in the swamps here, but all the specimens I have noted *have fibrous roots*. I will look more carefully after them this season, and report to you. The water has been so high here this Spring, that I have been unable to get out to where *Nuphar polysepalum* grows. They are already in bloom, and I do not know that it would do to send them now. I planted the seed which you sent me, in the swamp, and they are growing nicely. * * * * With many kind wishes, I remain,

MRS. R. M. A.

WILLIS, TEXAS, June 9, 1879.

MR. L. B. CASE.—*Dear Sir:* In your BOTANICAL INDEX of July, 1878, I note your remarks on the *Nelumbium*. You solicit correspondence &c., that more may be developed as to the nature &c. of this beautiful plant. In response to your invitation, I write, not to enlighten others, but, if possible, to so place myself in communication with those who are informed, that I may learn. It was my privilege last July to come unexpectedly upon a pond containing this plant. I had known it in my childhood in another portion of our State, but had never heard it mentioned here as being among the growth of our water plants. At the time this pond was first seen, the Lily was in full bloom. The portion of the lake containing the plants was absolutely covered with the rich green of the magnificent leaves, towering above which was the bloom, in every stage of development, presenting one of the most beautiful pictures I ever beheld. In November I again visited the pond, and secured quite a quantity of the seed; these I placed in the ground under water, and in water alone in bottles, in our early Spring, now, some three and one-half months ago; so far as may yet be observed, no impression has been made on the germ, and the seeds seem as hard and horny as when placed there. Other of the seed I cut the horny covering from, and these sprang up immediately; and from these I now have some beautiful young plants. How long will it take these plants to reach blooming maturity? If there should be any information that I could give by observation here, I will cheerfully supply it. * * * Very respectfully, &c.,

WILLIS FULLINIVIDER.

NEW ORLEANS, LA., February 25, 1879.

MR. L. B. CASE.—*Sir:* Your kind answer to my last has been on hand some time waiting attention. I had hoped that ere this, one of my roses would have reached you; but I am sorry to say that I was unfortunate enough to break the root of the plant I had so carefully saved for you. * * * *

We have had a fearful summer, but "no sickness came near our dwelling." * * * * We all prayed for frost, long before frost time. At length it came, and so furiously did it come down upon us, that we thought we had almost too severe a winter for this south land. Such freezing weather is uncommon here. For days, our ever-green landscapes were transformed with scenes of white, rime, sparkling ice. Our grass was like snow fields, and our trees, bending under the weight of clearly frozen rain, took strange and fantastic forms of icy beauty. Our evergreens looked like frozen fountains—stiff, white and cold, shining in the sun. Our sunlight never leaves us more than two days in the shade; so for two days, those who like such weather, enjoyed it; but the third day our boreal scene dissolved away, and I, for one, was glad. The Spring is fairly upon us. My little flower garden is bursting into fresh leaf, and I do think the long, cold winter has been of benefit to us in more ways than the killing off of yellow fever, as it has given our deciduous plants a good long rest. I expect splendid roses this year. The cold played havoc with my succulent plants in my little greenhouse, and I have grieved over the dozens of pots containing my lifeless pets which I have nursed and cared for so long. My vegetable garden is coming on; all sorts of seeds already planted, and peas six inches high. * * * * Respectfully, M. B. B.

N. B. Apropos of the yellow fever, we are all fearful of another visitation. If it comes, we will be ruined; for, as a State, we are bad enough off without this terrible scourge. M. B. B.

MORRIS, ILL., May 3, 1879.

MR. CASE.—*Sir:* Perhaps you would like to know how your former customer succeeds with her plants here in Illinois. My window is just a beauty, and a great comfort to me. Although I have many cares, I am never tired of caring for my plants. They are a refreshing rest. They do so nicely. I can't tell you all the varieties which have given me their bright blossoms all the winter; we have never been without several. King frost never got hold of one leaf, and I have scarcely seen a bug. My window has glass doors between it and my sitting-room, so I have no dust or dry air. My *Achœnia* has taken the lead; it blossomed all Summer; I then removed it to my window, where it has had from three to ten blossoms every day

this past Winter, and has several to-day. My Calla is next; it opened its first flower on New Year's day, and has bloomed nearly every month since, and it now has its fourth bud. I set the vase in a dish, half its height and two inches larger across, which I filled with coarse gravel and water, putting a few small, clean stones on the top of the vase. It keeps so clean and sweet, and does so nicely, that I wish some of your customers who cannot make their Callas bloom, would try it. I put it in my flower-garden, in summer, to rest. I cannot have much success with the Fancy Begonias. I have a large *Rex* which has blossomed twice; also, *Saundersi* and *Weltoniensis*. * * * Many thanks for your past favors. Yours,

C. T. H.

Chinese Sand Pear.

THOMASVILLE, GA., April 17, 1879.

MR. L. B. CASE.—*Dear Sir:* Your letter received to-day, and contents noticed. This Pear was sent to Liberty Co., Ga., about twenty-three or twenty-five years ago, by Maj. John LeComte, who resided, at that time, either in New York or Philadelphia during Summers, and spent his Winters with Mrs. H., his neice, in Liberty Co., Ga. Mrs. H. says that this tree was set out with other trees, and her attention was called to this one as being a foreign tree, and that it would not ripen the fruit in the northern states. This tree grew so rapidly that it soon claimed the attention of all; and a Mr. Barnadoe, a neighbor, took some cuttings from the tree and set them out on his own place near by, and one out of three grew. At this time the old tree began to give her annual installments of good, large, fine pears. This kind of fruit being rather new for that part of the country, (this was right on the sea coast) it created much excitement, and, of course, all were willing to give the tree a trial, and it was found to succeed well on all good dry soil. How this Pear first got the name of China Sand Pear, I am not able to tell; or where Maj. LeComte got this tree, no one living knows. In 1876, in September, the Thomas County Horticultural Society named this Pear after Maj. LeComte, after trying where to find more of its history and failing. This tree grows from cuttings or slips, cut off about fifteen inches long, and stuck in the ground like quinces, &c. It also grows well from grafting or budding; I had a number of them to grow ten feet high, in one season, and one inch through. This Pear tree comes into bearing, usually, in four or five years from cuttings; sometimes, in three. The habit of the tree is to grow very tall, and looks very much, at a distance, like the Lombardy Poplar. The leaves are a very deep green, glossy, and look as if they were burnished. This tree has never shown any signs of decay of any kind. It is first to take on foliage and last to drop it off in the Fall; and in this section, it always gives two crops of fruit the same year. We consider the fruit very good, indeed, and we obtain good prices for it in Boston and New York markets. I can see but little difference between this and the Bartlett, raised in this section, and I think it much better than the Duches, Louis B. D. Y., and many others of the leading varieties. This fruit is not very large; it will average eight ounces. It is very smooth, no blemishes, has a little blush on the sun-side, and ripens here about the 20th of July. My oldest trees are eight years old this Spring; last season they gave me about five bushels, to the tree, of good marketable fruit, which I sold from $3.50 to $5.50.

I have given you about all the information I can, and hope this will give you some idea of the new fruit and its worth to us down here, &c.

I remain yours, &c., H. H. SANFORD.

CARTHAGE, MO., May 12, 1879.

L. B. CASE.—*Sir:* * * * * We have some native plants here, which I think deserving of a place in cultivation. Among others, is the *Dodecatheon Meadia*, (white and purple) now in bloom, and the *Viola Delplinifolium;* they both do well in cultivation. A beautiful low growing pink Tradescantia—not the *T. Rosea* described in Wood's Botany—which blooms very early, the flowers coming directly from the root; but, I believe, as the season advances, they sometimes throw up a stalk with leaves and flowers; some are dark blue and purple, but I like the pink ones best. After a little, we shall have the wild Perennial Sensitive plant, or "Wise Briar," which, I suppose, is what Wood calls *Schrankia Uncinata*; it is very handsome and fragrant. There will be others as the season advances. * * * *

From statements made to me by many persons at and from the north, I am inclined to think you greatly underestimate the Tree Cranberry, (*V. Oxycoccus*) when you say none are of any economic value except the Black Haw. In western and northern New York, I have been refused the berries for planting, because they were wanted for cooking; and I know of their being a good deal used, and considerably prized, in Wisconsin and other places. Very truly,

JOHN C. TEAS.

* * * * HERBARIUM, * * * * July 5, 1878.

L. B. CASE.—*My Dear Sir:* You will remember sending us last spring a tuber, which proved to be that of a Sagittaria. Now, this question in regard to S. variabilis bearing tubers, has become a puzzling one. It is not referred to in the books, nor do herbarium specimens show any evidence of the existence of anything like tubers. Yet it is reported from Oregon that the Indians dig them for food, and it is said to grow in San Joaquin Valley, California, and to be used there for food by the Chinese. Moreover, Dr. Engelmann says that he has for several years known that they did bear tubers, though he says nothing of it in Gray's Manual. Seeing a fine growth of the plant in our pond, I have to-day set a man to digging for the roots, but not a sign of a tuber do I find. The plants which you sent are the only visible evidences we have that they are ever formed. This by way of prelude. Now will you, as you have opportunity, be so kind as to investigate the species growing in your locality, gather specimens in flower and in fruit, and especially go to the root of the matter, and see when and where these tubers are found. If you will do this and report at your convenience, you will probably help our botany, and will oblige,

Yours very truly, S.

ST. LOUIS, MO., June 21, 1879.

L. B. CASE.—*Dear Sir:* Your Sagittaria specimens, with effete tubers, are quite interesting. The fact that Sagittaria not only bears tubers, but possess the virtue only by the aid of these tubers just as the potato does and the Nelumbium, is well known. Many other plants, such as many ground orchids, do the same. They form in the fall as a receptacle of nourishment, and decay as soon as they are exhausted in spring or summer. Nymphæa is not so, but Nelumbium is eminently so, perennial only by the aid of such tubers.

Sagittaria Sinensis is even cultivated for such tubers, not only in China but also in California. I have long since tried to obtain the tubers to cultivate and study this species, but succeeded to get the tubers only last winter, and they were dead. They were about the same size as yours. Perhaps you, with your connections, can obtain them better—*late in fall*, would be the best time, I think.

Dr. Clapp, in his catalogue of Medical Plants of the United States, Philadelphia, 1852, p. 195, says of S. variabilis: Root is said to be acrid. Cooking destroys the acrid qualities of the roots, which have been used as food by the Indians and some of the inhabitants of Northern Europe.

Darlington, in his Flora Cestr., second edition, 1853, p. 395, says: Tubers 1 to 2 inches in diameter. Hogs are fond of the tubers and root them. Kelm, in his travels, (last century,) says they are sometimes as big as a man's fist. In first edition, 1826, he also speaks of the tubers, some of them the size of a goose egg; mild to the taste, and, I have no doubt, nutritious.

Why Clapp calls them acrid, I do not know. Here you have American authorities as far back as 1826!

Your tubers are of S. variabilis, Eng. The separate specimen is S. graminea, Michx., which used to be often, commonly called S. simplex, Pursh. I have distinguished S. variabilis, our American plant, from S. sagittifolia, of Europe, as early as 1840 or '41, but I think it was published first in Gray's Manual, second edition.

Sagittaria calycina, I discovered here about 1853, but it was published only in Torrey's Botany of the Mexican Boundary, 1859. This *bears no tubers*, but seems to be annual!

Yours truly, G. ENGELMANN.

[The above letters, although not intended for publication, illustrate many points in our article so faithfully that we have violated the rules of privacy and confidence, but hope this explanation will prove satisfactory for so doing. The first letter, from Prof. S., illustrates the general belief in regard to the American form of Sagittaria among all botanists (himself one of the first botanists in the country) and collectors, while Dr. Engelmann's letter is, as usual with all his letters, replete with information.]

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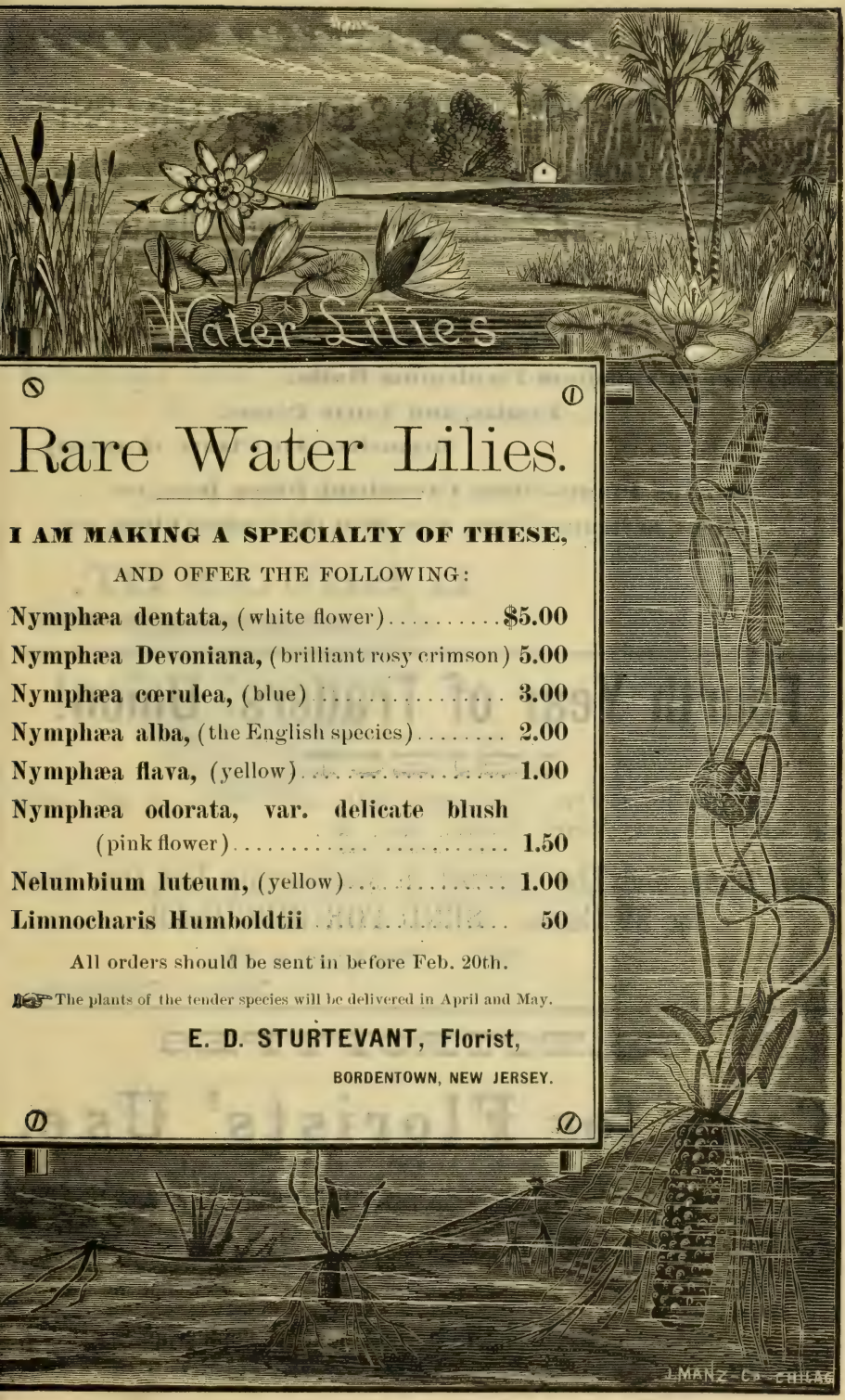

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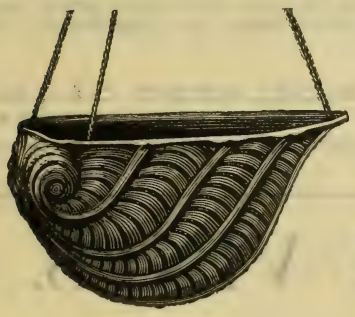

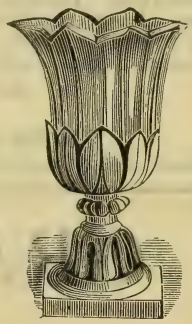

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